IN THE CLAIMS:

1. (Currently Amended) A method of operating a fuel cell having an anode, a water-repellant cathode, a proton exchange electrolyte membrane interposed between the anode and cathode, and a separator having grooves formed in one surface thereof, said grooves extending straight continuously in completely spanning the one surface between opposing first and second ends thereof, the one surface of the separator being in contact with said cathode with said grooves open to and closed by said cathode, said method comprising:

generating water by reaction of oxygen with hydrogen at the cathode, the water moving from the cathode to the anode;

maintaining the electrolyte membrane in a moist condition by permeation of the generated water through the electrolyte membrane, from the cathode toward the anode;

providing the cathode comprising PTFE embedded in carbon cloth forming one surface which is in contact with the separator and which is water-repellent and a catalyst coating forming a second surface opposite the one surface and facing the electrolyte membrane;

~~providing the cathode in the form of a carbon cloth in which PTFE is embedded;~~

~~providing a film of a platinum group catalyst on a surface of the cathode facing the electrolyte membrane;~~

supplying a gas containing hydrogen ~~first gas including hydrogen gas~~ to the

anode via a first gas flow passage;

supplying a gas containing oxygen ~~second gas including an oxidizer~~ to the cathode via a second gas flow passage formed separately from ~~inclusive of the grooves and separate~~ from said first gas flow passage; and

supplying water to one end of the second gas flow passage for contact in liquid state with the water-repellent surface of the cathode and for removing heat as latent heat, thereby cooling the fuel cell ~~spraying liquid water from at least one spray nozzle into the first ends of said grooves, into contact with a surface of said cathode and, in liquid state, out the second ends, thereby maintaining said electrolyte membrane in a moist condition~~, said water-repellency preventing water deposition on the cathode which would decrease the effective surface area of the cathode.

2. (Currently Amended) A fuel cell operating method according to claim 1 further comprising detecting an output voltage of the fuel cell and controlling a quantity of water supplied ~~sprayed~~ in response to the detected output voltage.

3. (Cancelled)

4. (Currently Amended) A fuel cell operating method according to claim 15 wherein said supplying ~~spraying~~ is intermittent.

5. (Cancelled)

6. (Previously Presented) A fuel cell operating method according to claim 15 wherein the liquid water is dispersed over the entire surface of the cathode.

7. (Currently Amended) A fuel cell operating method according to claim 1 further comprising calculating an optimum quantity of ~~spray~~ water as that quantity of ~~spray~~ water determined to maintain temperature of the fuel cell within a predetermined temperature range and controlling the supplying ~~spraying~~ to supply ~~spray~~ the calculated optimum quantity of liquid water onto the surface of the cathode.

8. (Cancelled)

9. (Cancelled)

10. (Currently Amended) A fuel cell operating method according to claim 15 wherein the water is supplied ~~sprayed~~ at a predetermined constant pressure over a predetermined time interval.

11. (Cancelled)

12. (Cancelled)

13. (Cancelled)

14. (Cancelled)

15. (Currently Amended) A method of operating a fuel cell having a solid polymer electrolyte membrane interposed between an anode and a cathode and a separator arranged opposed to the anode or the cathode and including a flow passage for supplying gas, comprising:

providing the solid electrolyte membrane with a thickness allowing water generated at the cathode to permeate through the solid electrolyte membrane toward the anode, thereby maintaining the electrolyte membrane in a moist condition;

providing the cathode comprising carbon cloth with embedded PTFE forming a first surface facing the separator and a catalyst coating forming a second surface of the cathode facing the electrolyte membrane; and

~~providing the cathode with water repellency, said cathode being in the form of a carbon cloth with embedded PTFE; and~~

supplying liquid water in droplet form into one end of ~~through~~ the flow passage and into contact with the first, water-repellent surface of ~~to~~ the cathode, vaporization of the water in the flow passage serving to cool the fuel cell ~~of the separator preventing moisture in the electrolyte membrane from vaporizing to keep the electrolyte membrane in a moist condition~~.

16. (Currently Amended) A fuel cell operating method according to claim 15 further comprising detecting an output voltage of the fuel cell and controlling a quantity of water supplied ~~sprayed~~ in response to the detected output voltage.

17. (Currently Amended) A fuel cell according to claim 15 further comprising calculating an optimum quantity of ~~spray~~ water as that quantity of ~~spray~~ water determined to maintain a proper moisture content within the electrolyte membrane and controlling the liquid water supplied ~~sprayed~~ to provide the calculated optimum quantity of liquid water onto the surface of said cathode.

18. (Currently Amended) A fuel cell operating method according to claim 15 further comprising calculating an optimum quantity of ~~spray~~ water as that quantity of ~~spray~~ water determined to maintain temperature of the fuel cell within a predetermined temperature range and controlling the supplying ~~spraying~~ to supply ~~spray~~ the calculated optimum quantity of liquid water onto the surface of the cathode.

19. (Cancelled)

20. (Previously Presented) A fuel cell operating method according to claim 15 wherein the electrolyte membrane has a thickness allowing water produced by fuel cell reaction at the cathode to permeate through the membrane toward the anode.

21. (New) The operating method according to Claim 1 wherein the catalyst coating is a thin film of a predetermined even thickness of a platinum group catalyst.

22. (New) A fuel cell operating method according to Claim 15 wherein the catalyst coating is a thin film of a predetermined even thickness of a platinum group catalyst.

23. (New) A fuel cell operating method according to Claim 1 wherein the quantity of water supplied is an amount determined to provide maximum cooling by vaporization.

24. (New) A fuel cell operating method according to Claim 15 wherein the quantity of water supplied is an amount determined to provide maximum cooling by vaporization.

25. A fuel cell operating method according to Claim 1 wherein the moist condition of the electrolyte membrane is maintained only by the water generated at the cathode.

26. A fuel cell operating method according to Claim 15 wherein the moist condition of the electrolyte membrane is maintained only by the water generated at the cathode.